ICS-1 • SFHC-1

Instruction Manual

Integrated Capping Shutter 1 ICS-1
Single Frame Hand Control SFHC-1
As of: June 28th 1999

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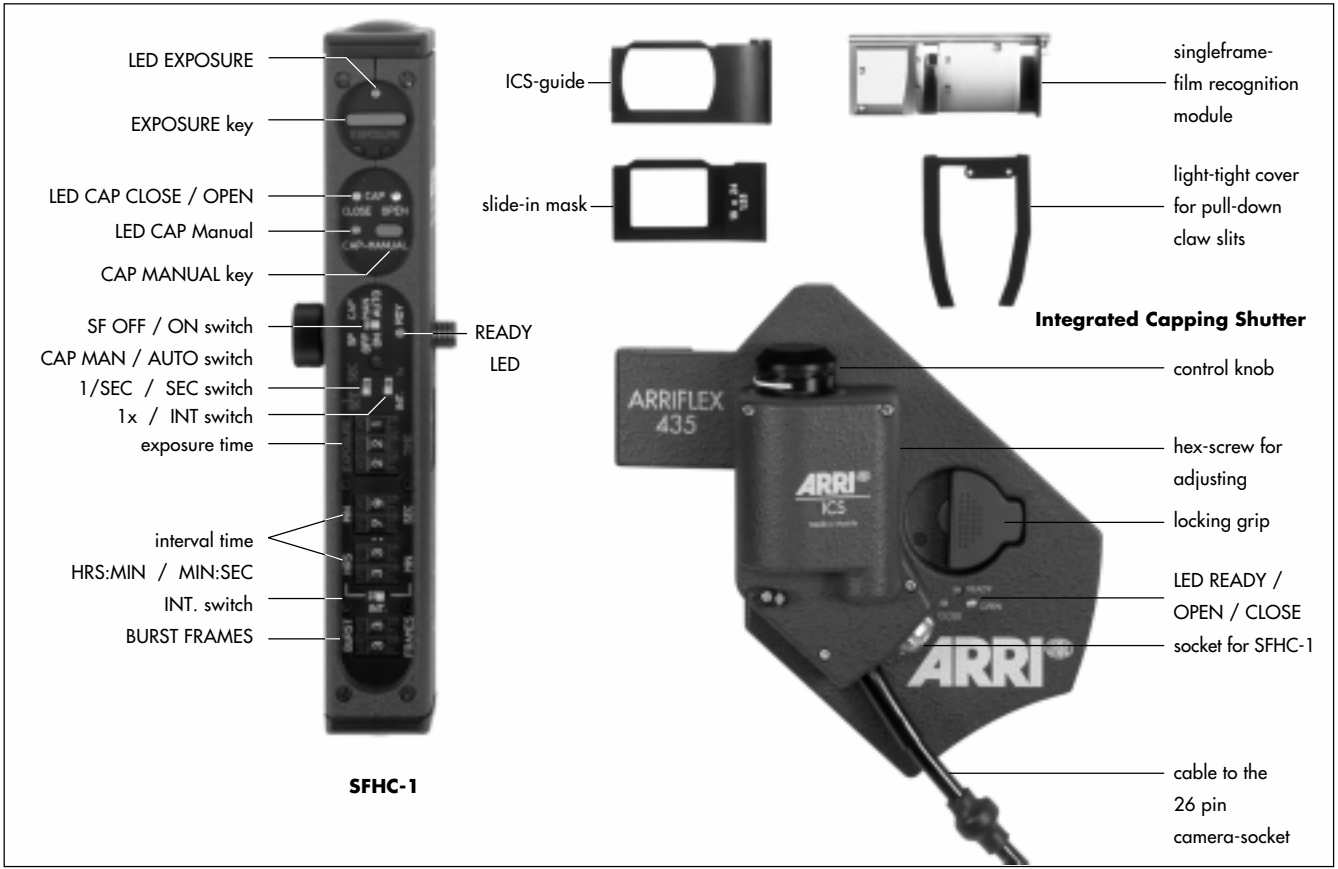
LED EXPOSURE
EXPOSURE key
LED CAP CLOSE / OPEN
LED CAP Manual
CAP MANUAL key
SF OFF / ON switch
CAP MAN / AUTO switch
1/SEC / SEC switch
1x / INT switch
exposure time
interval time
HRS:MIN / MIN:SEC
INT. switch
BURST FRAMES
READY LED
SFHC-1
ICS-guide
slide-in mask
singleframe-film recognition module
light-tight cover for pull-down claw slits
Integrated Capping Shutter
control knob
hex-screw for adjusting
locking grip
LED READY / OPEN / CLOSE
socket for SFHC-1
cable to the 26 pin camera-socket
ARRIFLEX 435
ARRI ICS
ARRI

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2. Safety Instructions

Warnings

Note: Operational error possible!

Danger of injury or damage to the equipment!

General Safety Instructions

Attention! Danger of injury! Never reach into the lens mount receptacle, the interior of the camera or the magazine while the camera is running.

- To ensure safe, proper operation, please familiarise yourself with this instruction manual.
- Assembly and initial operation should be carried out by trained personnel only!
- Never run the camera without a lens or protective cap on the lens mount receptacle!
- Never operate the movement locking mechanism while the camera is running!
- Ensure that the camera is in a stable position!
- Remove the battery cable before transporting the camera!
- Remove the battery cable before carrying out maintenance or cleaning!
- Repairs should only be carried out by authorised service centers!
- Use only original ARRI spare parts and accessories!

Important Instructions

- In wet weather precautions must be taken to protect electrical equipment.
- Avoid operational errors!
- Do not remove any screws which are secured with paint!

Product Specifications

In case of enquiries or when ordering, always state the model and serial numbers.

Explanation of the Symbols in this Instruction Manual

➪ **photo** indicates objects shown in the photographs.

Note on Compliance:

This product and the accessories recommended by the manufacturer comply with the requirements of EU-Guideline 89/336/EWG.

3. General Description

System Overview

The system comprises the following components:

- The Singleframe Hand Control Unit SFHC-1 ⇨ **photo**, which facilitates setting all important parameters for singleframe shots.

- The Integrated Capping Shutter (ICS), which ensures that the camera is light-tight around the mirror shutter for a period of approx. one hour for taking singleframe shots.

- The Singleframe Film Recognition Module ⇨ **photo**, which is used instead of the standard film recognition module or the time code module to reduce the curvature of the film loop.

- The Singleframe Software, which controls all singleframe functions in the ARRIFLEX 435.

- The Slide-In Mask ⇨ **photo** and the ICS-Guide ⇨ **photo** to modify the film gate.

- A light-tight cover ⇨ **photo** for the pull-down claw slits and the register-pin holes in the film gate.

ARRI
ACC
CCU
26 pin socket

4. Modifying the ARRIFLEX 435 for Singleframe Takes

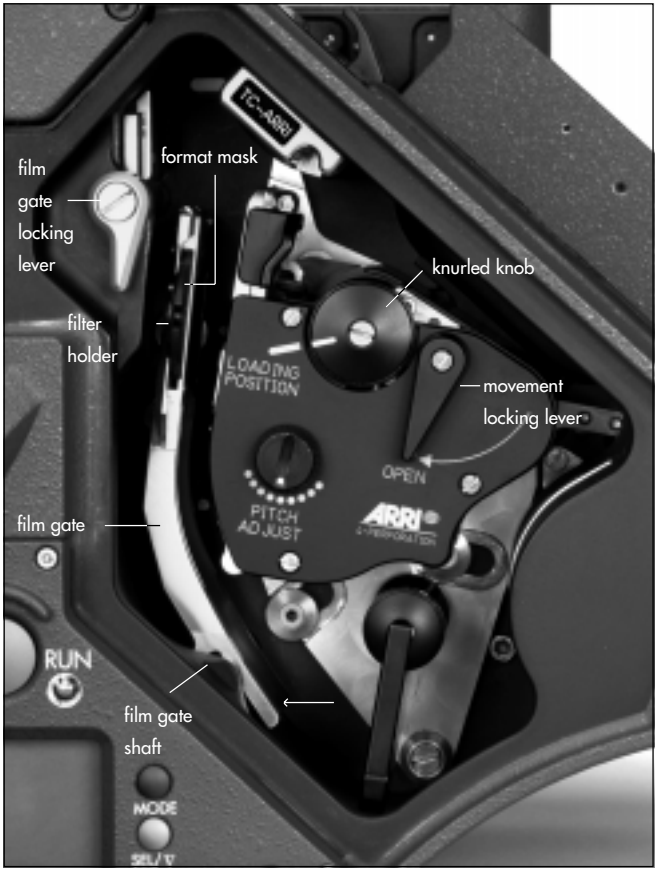
First, check that a 26-pin socket is visible on the right lower side of the camera, as this is necessary for singleframe takes.

If there is no socket, the camera must be modified by an authorised ARRI service center.

4.1 General

Due to the design of mirror-reflex film cameras, stray light may pass around the mirror shutter onto the film when the camera is not running. For normal film shots this is not a problem, as the affected images fall into the camera run-up, which is usually not used anyway. On singleframe shots however, the stray light which during interval time can fall onto the film around the mirror shutter can affect the quality of the exposed singleframes.

The ARRI Integrated Capping Shutter covers the film during the interval time with a thin metal plate. The metal plate is pushed into the film gate after exposure. Before the next exposure the plate is removed.



4.2 Preparing the Film Gate

To accomodate the movement of the pulldown claw during film-transport, the film gate is designed with vertical slits on both sides. Furthermore, there are two holes for the register-pins. These openings must be covered to prevent stray light from reaching the film.

To enable the shutter plate of the Integrated Capping Shutter to slide into the film gate, a special guide is inserted into the film gate in place of the filter holder. The plate then slides into this ICS-Guide. Due to the form of the ICS-Guide it is necessary to use special format masks.

- Before removing the film gate turn off the camera's main switch and remove the camera from the power supply.
- Turn the knurled knob ➪ **photo** until its marking matches that on the movement block.
- Turn the movement locking lever ➪ **photo** to the "OPEN" position. This will cause the movement block to swing away from the film gate.

- Press the film gate locking lever ➪ **photo** towards the magazine throat assembly and push the film gate ➪ **photo** towards the movement block, pressing lightly on the lower end of the film gate ➪ **photo** and paying attention that the film gate does not hit the movement block.

- Grasp the film gate by the filter holder ➪ **photo** and remove it by pulling upwards.

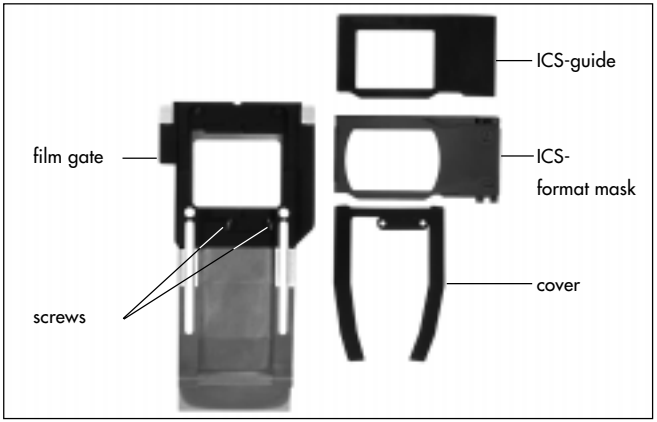
- Pull the filter holder sideways out of the film gate.

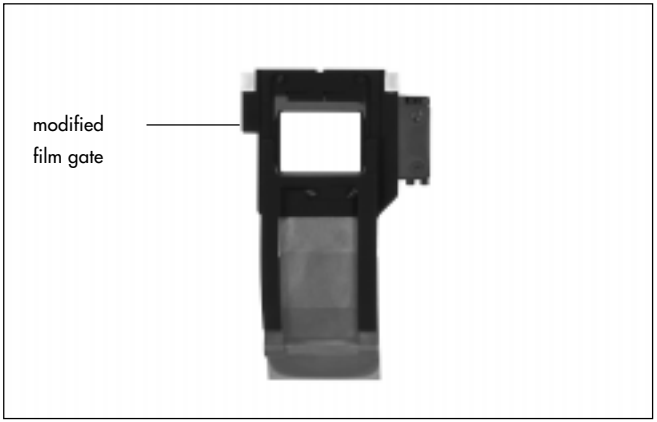
- Press the format mask ➪ **photo** on its side plate backwards slightly and pull out of the film gate.

The filter holder and the format mask are held in position by leaf springs. These leaf springs are each held by two screws to the film gate.

- Entirely remove the screws holding the lower single leaf spring, leaving the spring in place.

- Place the cover for the film gate openings over the fastening holes of the leaf spring. The cover will deform slightly. Then screw in the cover and the leaf spring with the two screws.





- Slide the new singleframe format mask sideways into the film gate ⇨ **photo** (page 11).
- Slide the ICS-Guide ⇨ **photo** (page 11) sideways into the film gate.
- Check that the film gate and the film gate shaft are free of dust and dirt.
- Grasp the film gate by the ICS guide and place it from above onto the film gate shaft.
- Check that the film gate is placed correctly on its shaft.
- Press the lever towards the magazine throat assembly and flip the film gate back into its correct position.
- Ensure that the lever swings back fully.

Note: The film gate can only be locked if the format mask and filter holder are correctly inserted.

Swinging the movement block forwards when the film gate is not correctly in place can cause damage to the equipment!

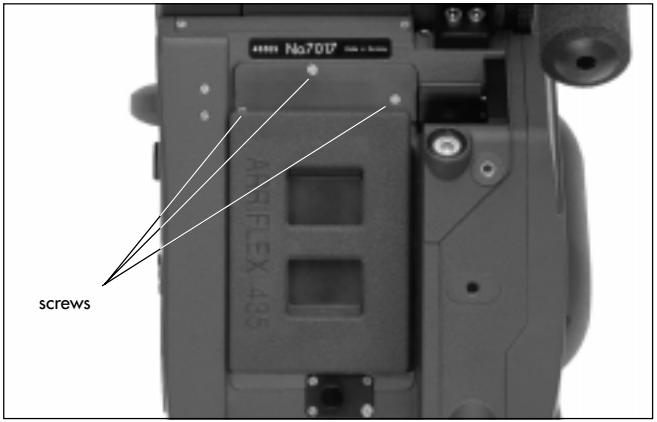
4.3 Attaching the Singleframe Film Recognition Module

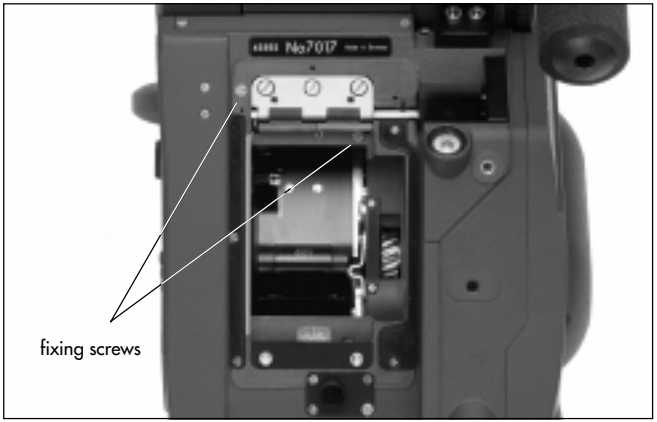
- The Singleframe Film Recognition Module is used instead of the standard film recognition module or the time code module to reduce the loop curvature.

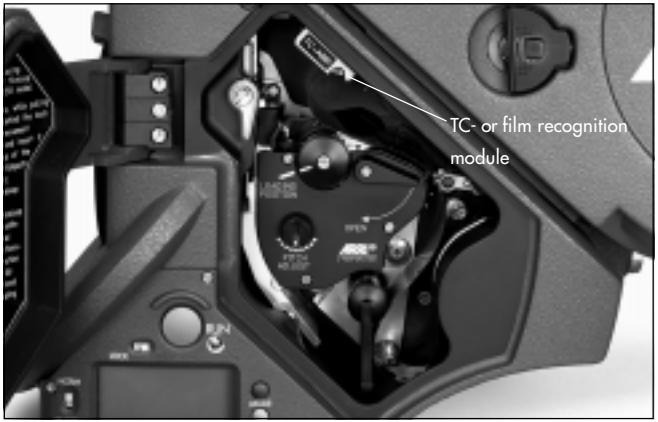
On singleframe shots with the standard film end recognition module or time code module, the film curvature can cause unfocused images.

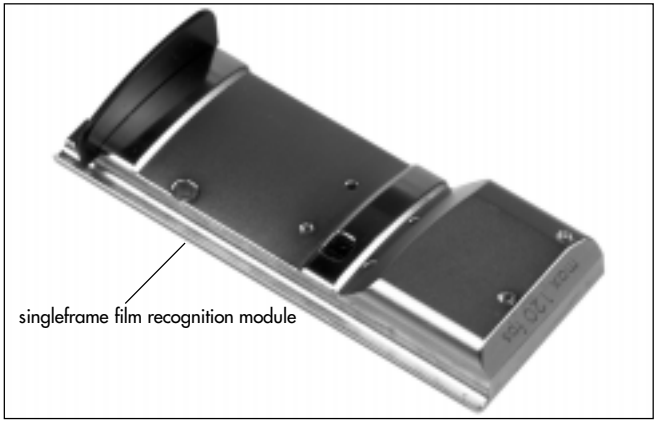
The Singleframe Film Recognition Module may only be used up to max. 120 fps in normal camera operation, as otherwise the camera may switch off while running or damage the film.

- Switch off the main camera switch and remove the camera from the power supply.
- Remove the three screws from the magazine locking cover ⇨ **photo**.
- Remove the magazine locking cover.
- Hold the film recognition module tightly to prevent it from falling onto the movement block and damaging the module's surface.
- Unscrew both fastening screws ⇨ **photo**.









- Remove the film recognition module ➪ **photo** by pulling it towards the movement block.

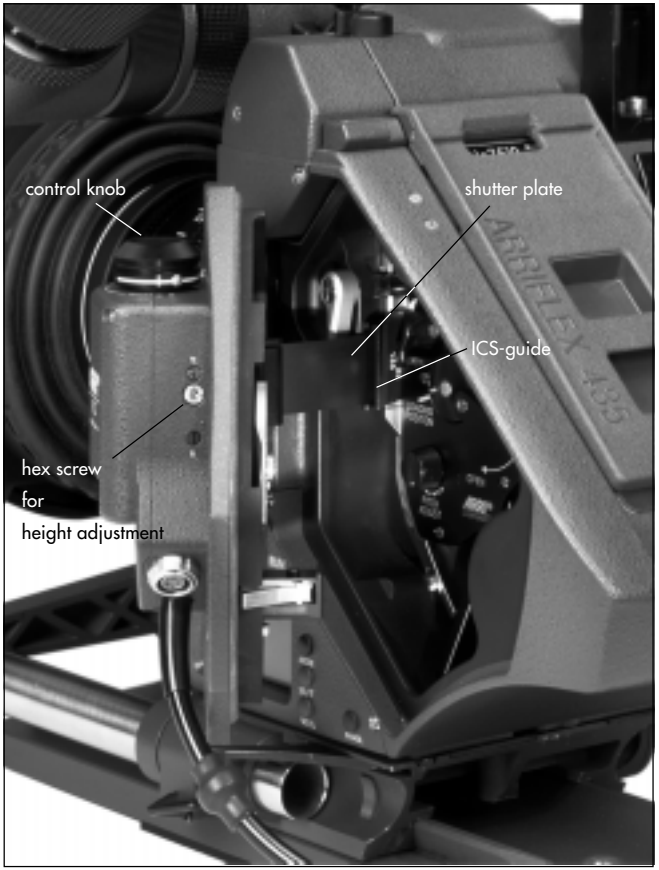
When attaching the new module, ensure correct plug positioning as otherwise damage could be caused to the plug contacts!

- Attach the singleframe film recognition module ➪ **photo**.
- Screw tight the two fastening screws ➪ **photo** (page 13).
- Replace the magazine locking cover and fasten with the three screws ➪ **photo** (page 13).

4.4 Attaching the Integrated Capping Shutter

To prevent stray light from falling on the film during the interval time, the ARRI Integrated Capping Shutter covers the film with a thin metal plate. After each exposure the metal plate is pushed into the film gate and removed immediately before the next exposure. The metal plate slides into the ICS-Guide attached to the film gate. To ensure optimum operation, the plate of the Capping Shutter must be aligned with the ICS-Guide.

- Switch off the main camera switch and remove the camera from the power supply.
- Open the camera door and remove the two fastening screws ➪ **photo**. Any spacers between the hinge and the camera housing should on inside the housing.
- Attach the Integrated Capping Shutter door by its hinge to the camera housing and tighten slightly the two screws.
- Position the Integrated Capping Shutter door so that there is an even gap to the housing and the door can be correctly opened and closed.
- Tighten the two screws ➪ **photo**.
- Open the Integrated Capping Shutter door by approx. 30° and turn the door lock to the shut position.



- Press the control knob ⇨ **photo** on the Integrated Capping Shutter and turn until the black plate reaches the ICS-Guide.

Note: If the knob cannot be turned check if the door lock is really in the shut position.

Do not use force to push the plate into the ICS-Guide, as this could damage the plate or the guide.

- Check that the plate can be pushed into the ICS-Guide easily and without catching. The height of the plate can be set on the side of the ICS with the hex key ⇨ **photo**.

Note: If the height of the plate is correctly set but it still catches when being pushed in, the positioning of the entire ICS door on the camera should be re-checked.

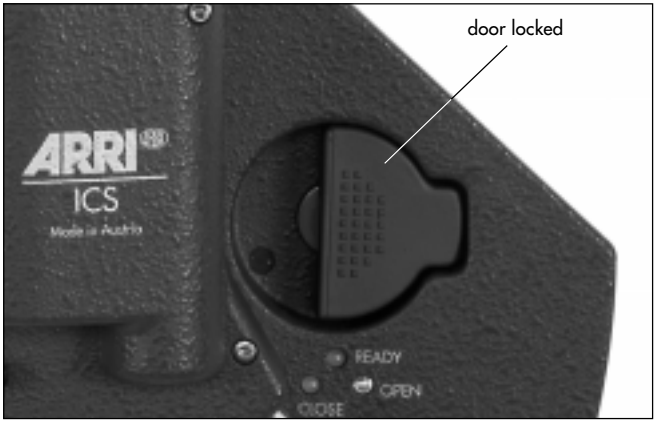
- Check again that the plate slides into the ICS-Guide easily and without catching.

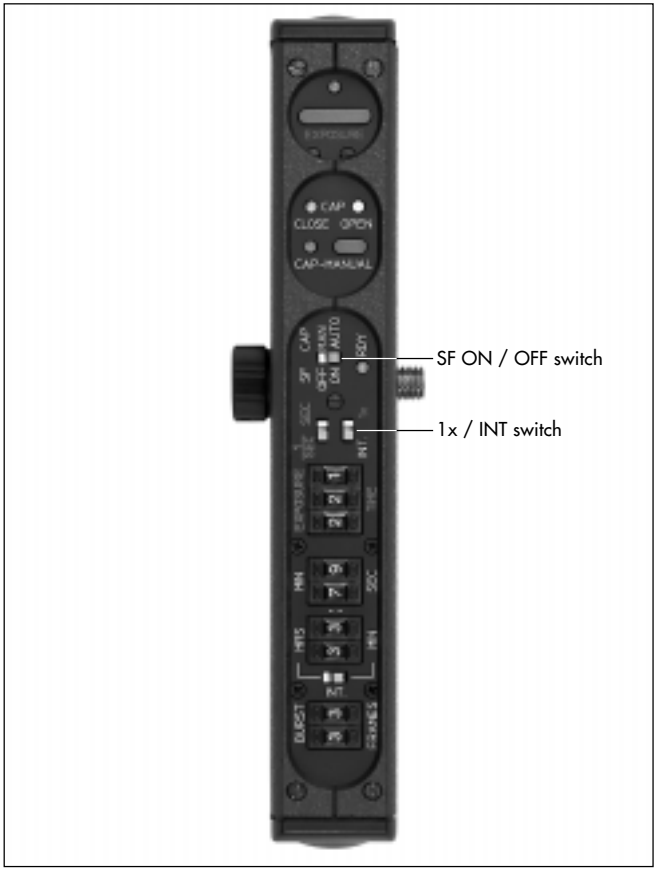
- Press the control knob of the Integrated Capping Shutter and turn it until the black plate disappears in the ICS door. Close and lock the ICS door.

To prevent inadvertent opening of the camera door, it can only be opened when the Integrated Capping Shutter is open.

- Press the control knob of the Integrated Capping Shutter and turn. The plate will be pushed slowly into the ICS-Guide. Pay attention to proper and smooth operation.

- Plug the cable of the Integrated Capping Shutter into the 26-pin socket ➪ **photo** on the lower right side of the camera and screw tight.





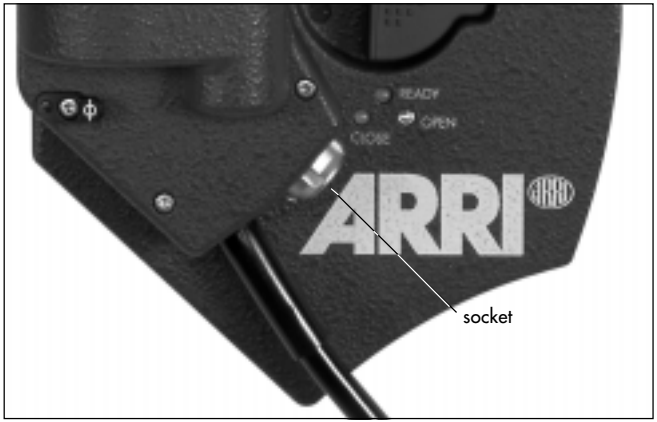
4.5 Attaching the Singleframe Hand Control Unit SFHC-1

When attaching the Singleframe Hand Control, damage can be caused to the shutter plate if it does not slide into the ICS-Guide correctly. Therefore check manually before attaching the Singleframe Hand Control to see if the Capping Shutter plate slides easily into the ICS-Guide (see chapter Attaching the Integrated Capping Shutter).

- Turn the SF or CAP switch ➪ **photo** to the OFF or MAN position. Turn the 1x / INT switch ➪ **photo** to the 1x position.
  This switches off singleframe operation and the Integrated Capping Shutter can later be operated by the CAP-MANUAL key.

- Plug the SF-C1-S cable into the socket marked CAMERA ➪ **photo** on the Singleframe Hand Control and the Integrated Capping Shutter ➪ **photo**.

The LED next to the CAP-MANUAL key illuminates green.



5. ARRIFLEX 435 in Normal Operation

The camera, once modified for singleframe operation, can be used normally **with some restrictions**.
The following points should be taken into consideration:

The camera may be operated at max. 120 fps with the special singleframe film recognition module, as at higher speeds the camera is in danger of switching off while running or may damage the film.

Before starting the camera run, check if the Integrated Capping Shutter is completely opened.

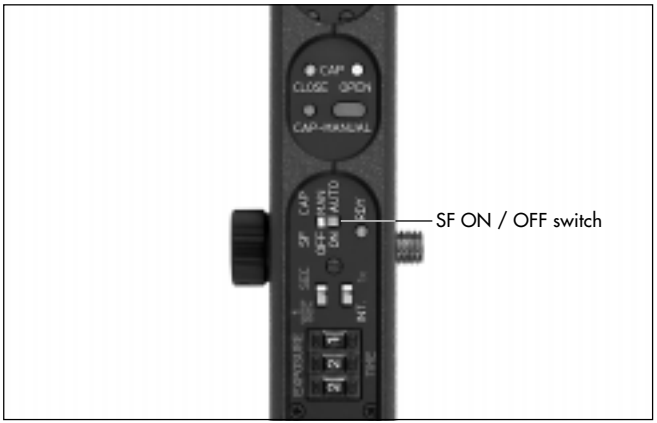
Due to the light-tight cover for the pull-down claw slits and the register-pin holes in the film gate, dirt or film snippets may collect in the film gate. It must therefore be checked and cleaned far more often than in normal operation.

Note: If the camera is running in normal mode and the Capping Shutter is not completely open, the entire camera display or the RCU-display and the ASY symbol in the viewfinder blink.

Switching on Normal Operation

- Turn the SF ON/OFF switch to the OFF position.

The camera can be used normally.



6. Integrated Capping Shutter

6.1 Light-Tightness

Due to the design of mirror-reflex film cameras, stray light may pass around the mirror shutter onto the film when the camera is not running. For normal film shots this is not a problem, as the affected images fall into the camera run-up, which is usually not used anyway. On singleframe shots however, the stray light, which can fall onto the film around the mirror shutter during interval time, can affect the quality of the exposed singleframes.

The maximum interval time which can pass between exposing two singleframes without the images being affected is referred to as the light-tightness of the camera. The light-tightness on normal mirror reflex cameras is very short due to the general construction. On the standard ARRIFLEX 435 this interval can be less than one second under disadvantageous circumstances.

To prevent light from falling onto the film during the interval time, so-called capping shutters are used. These capping shutters are usually leaf shutters which are mounted in front of the camera lens. As long as the leaf shutters are closed, no light can reach the lens or the film. The capping shutter is opened just before exposure of the singleframe and then closed again. A disadvantage of this type of capping shutter is that there is no way to evaluate the image through the viewfinder – the lens and therefore also the viewfinder remain light-tight.

The Integrated Capping Shutter on the other hand, blocks the light behind the mirror, i.e. directly in front of the film gate. Thus, viewing the image through the viewfinder is always possible. However, since light is admitted into the camera-body, even with the Integrated Capping Shutter the camera is only light-tight for approx. one hour **under normal lighting conditions**. For interval times of over an hour, an external capping shutter should be used in front of the lens **in addition to** the Integrated Capping Shutter (see chapter External Capping Shutter).

It is also necessary to close the eyepiece of the viewfinder to prevent light form leaking through the viewfinder into the camera.

The following five important rules result:

Never shoot singleframe shots without the Integrated Capping Shutter.

During interval times of over an hour use an external Capping Shutter in addition to the Integrated Capping Shutter.

To ensure that the light-tightness of the camera is sufficient, check for light-tightness under the same conditions as the intended shots.

During interval times of over a few seconds, the camera or magazines parts which do not need to be accessible should be covered with a black cloth or similar.

Allways close the eypiece after checking the viewfinder before filming single frames.

6.2 Operating the Integrated Capping Shutter

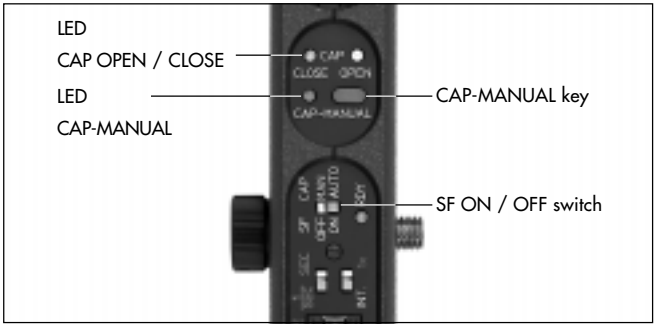
Attaching the Integrated Capping Shutter has already been described in the chapter *Attaching the Integrated Capping Shutter*.

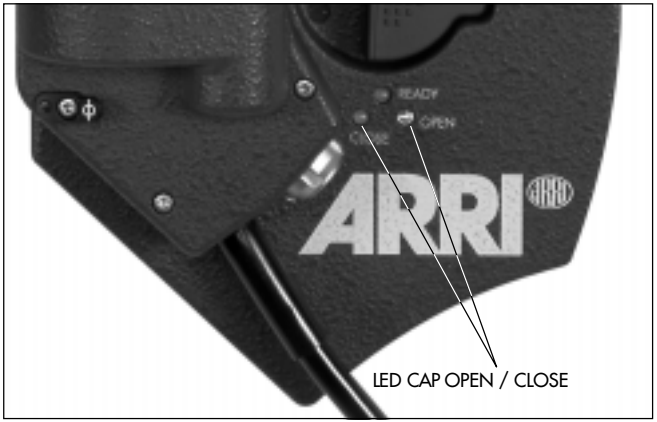
6.2.1 Singleframe Operation switched off

As long as the singleframe function is switched off by the Singleframe Hand Control (SF switch in position OFF), the Integrated Capping Shutter can be opened or closed by pressing the CAP-MANUAL key ⇨ **photo**. The OPEN or CLOSE LED on the ICS door ⇨ **photo** and the Singleframe Hand Control ⇨ **photo** illuminate.

6.2.2 Singleframe Operation switched on

As soon as the singleframe function is activated by the Singleframe Hand Control, the Integrated Capping Shutter is controlled automatically and can no longer be influenced manually.





6.2.3 *Manual Operation (only in case of failure or while attaching)*

To open the camera door in case or power failure, and when attaching the Integrated Capping Shutter, it is possible to manually operate the plate on the Integrated Capping Shutter.

- Switch off the camera's main switch and remove the camera from the power supply.
- Press the control knob ⇨ **photo** on the Integrated Capping Shutter and turn clockwise until the plate disappears in the ICS door (OPEN position).

The camera door can only be opened if the Integrated Capping Shutter is open. Manual operation of the Integrated Capping Shutter is only possible if the door lock is shut.

7. Singleframe Hand Control Unit SFHC-1

The Singleframe Hand Control Unit SFHC-1 facilitates setting all parameters necessary for the exposure of singleframe shots.

The Singleframe Hand Control takes over control of the camera and the attached Capping Shutter as soon as the SF switch is ON ➪ **photo**. In the position SF OFF, only the Capping Shutter can be operated.

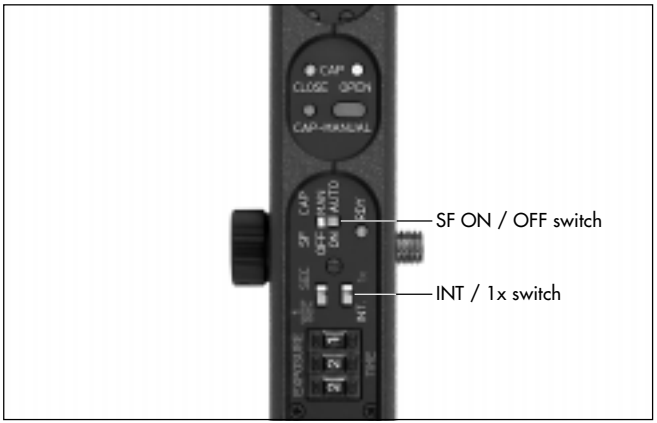
There are two different main operation modes:
- recording singleframes
- intervallometer operation

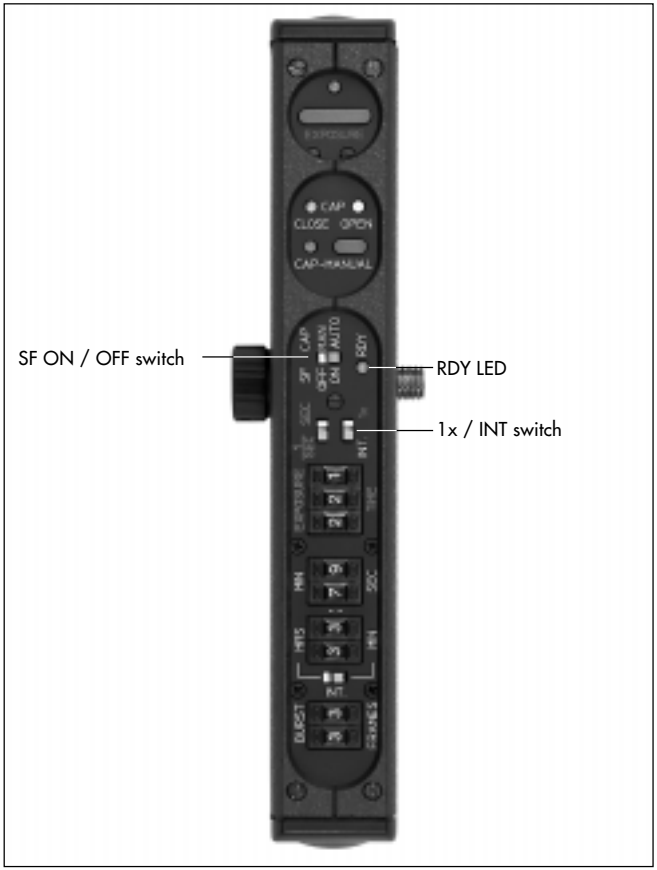
Recording Singleframes

When recording singleframes, a certain number of singleframes is directly recorded in sequence each time the exposure key is pressed. Then the Singleframe Hand Control waits until the exposure key is pressed again. The number of images recorded each time is set with the BURST FRAMES keys.

Intervallometer Operation

In intervallometer operation, after switching the 1x / INT switch ➪ **photo** to the INT position, the interval time starts running and a certain number of singleframes is recorded. At the end of the interval time, the interval starts running again and the same number of singleframes are exposed. This process carries on automatically until the 1x / INT switch is returned to the 1x position.





7.1 Switching on Singleframe Operation

Before switching on singleframe operation, ensure that the singleframe guide is correctly installed, that the plate on the Integrated Capping Shutter can be moved easily, that the Singleframe Film Recognition module is attached, that the cover for the openings in the film gate is correctly attached and that the eyepiece is closed (see chapter Preparing the ARRIFLEX 435 for Singleframe Shots).

- Turn the 1x / INT ➪ **photo** switch to 1x.
- Turn the SF switch to ON ➪ **photo**;
  the RDY LED ➪ **photo** illuminates red briefly (initialising), then green.

Note: When singleframe operation is switched on, the Integrated Capping Shutter is controlled automatically by the Singleframe Hand Control and can therefore not be operated manually.

7.2 Recording Singleframes (Photographic Mode)

When recording singleframes, a certain number of singleframes is recorded directly in sequence each time the exposure key is pressed. Then the Singleframe Hand Control waits until the exposure key is pressed again.

- The 1x / INT switch ➪ **photo** must be at the 1x position.

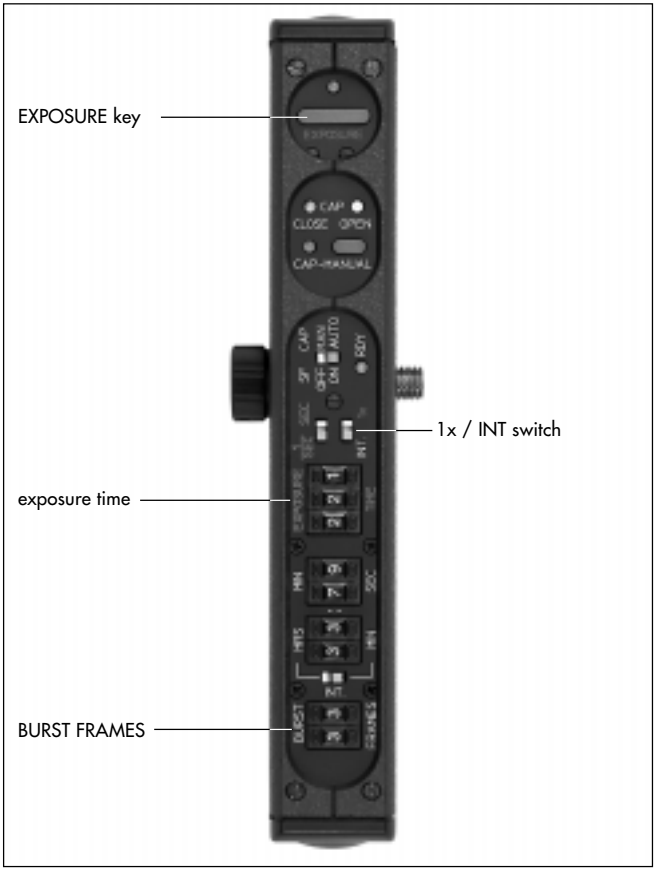
7.2.1 Setting the Repeat Counter (burst)

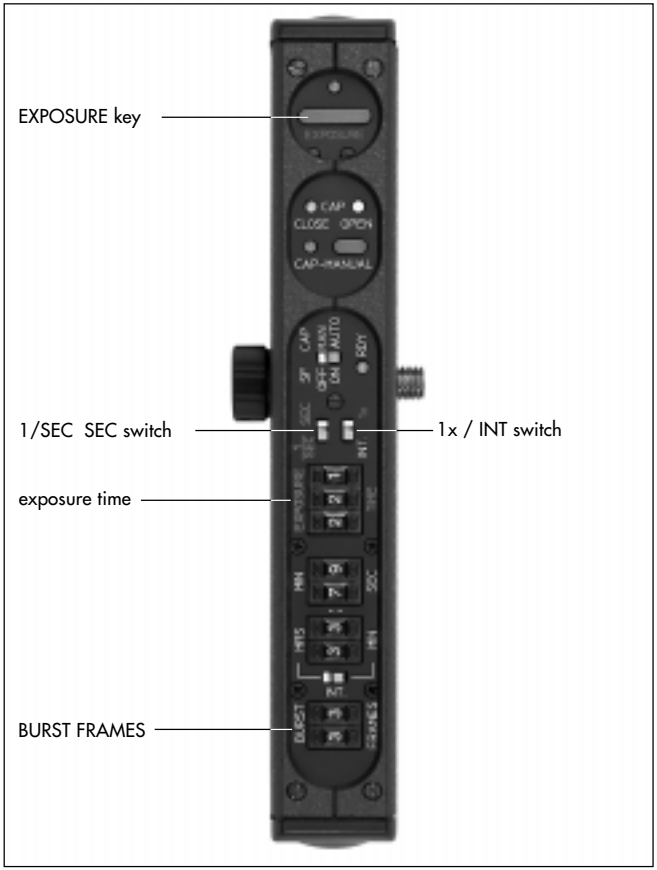
The repeat counter ➪ **photo** sets the number of singleframes which will be recorded each time the exposure key ➪ **photo** is pressed.

- Set the desired number with the BURST FRAME keys ➪ **photo**.

On the repeat counter, values from 0 to 99 frames can be set.

Note: If the repeat counter is set to 0, one frame will still be recorded when the exposure key is pressed.





7.2.2 Setting the Exposure Time

The shortest exposure time with a camera shutter angle of 180° is 1/8 second. All shorter exposure times are set by adjusting the angle of the mirror shutter on the camera. The ARRIFLEX 435ES is equipped with an electronically adjustable mirror shutter. This enables the shutter angle to be automatically adjusted for shorter exposure times by the Singleframe Hand Control. On the Singleframe Hand Control various exposure times can be set:
exposure times from 1/128s to 999s with an ARRIFLEX 435ES, and exposure times of 1/8s to 999s when using an ARRIFLEX 435.

If exposure times of under 1/8 s are required on an ARRIFLEX 435, the shutter angle must be manually adjusted beforehand (see Instruction Manual ARRIFLEX 435).

Note: On longer exposure times – over approx. one second – the reciprocity behaviour of the film becomes visible. This means that the film's colour reproduction changes. Further information is available from the film manufacturers.

- Set the desired exposure time with the EXPOSURE TIME keys ⇨ **photo**.

- With the 1/SEC SEC switch ⇨ **photo**, select if the exposure time is displayed as whole seconds or as fractions of a second.

For cameras with an electronically adjustable mirror shutter the shutter angle is adjusted by the Singleframe Hand Control. Prior settings will be overwritten.

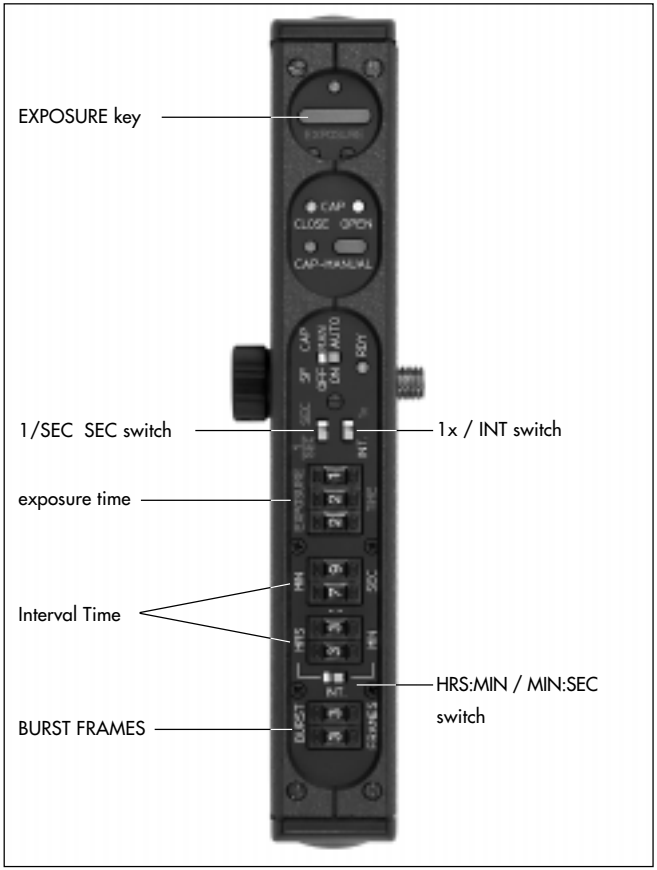
7.2.3 Recording Singleframes

- Press the exposure key ⇨ **photo**.

After pressing the exposure key the Integrated Capping Shutter opens. Then the number of singleframes set on the BURST FRAMES switch will be recorded with the set exposure time. After the last singleframe the Integrated Capping Shutter closes again.

- For further singleframes press the exposure key again.

Note: For recording singleframes a matching interval time must also be set.



7.3 Intervalometer Operation

For intervalometer operation the 1x / INT switch ➪ **photo** is set to the INT position. The interval time begins running, the integrated capping shutter opens and a certain number of singleframes is recorded. After the set interval time has ended the process is repeated and the same number of singleframes is recorded. This operational mode is completely automatic and continues until the 1x / INT switch is returned to the 1x position.

The interval time is defined as follows: it extends from the opening of the Integrated Capping Shutter for the first singleframe of a singleframe cycle to the opening of the Integrated Capping Shutter for the first singleframe of the next singleframe cycle.

7.3.1 Setting the Repeat Counter (burst)

The repeat counter sets the number of singleframes to be recorded in a cycle.

- Set the desired number with the BURST FRAMES switches.

Values from 0 to 99 frames can be set on the repeat counter.

Note: If the repeat counter is set to 0, one frame will still be recorded when the exposure key is pressed.

7.3.2 Setting the Exposure Time

The shortest exposure time with a camera shutter angle of 180° is 1/8 second. All shorter exposure times are set by adjusting the angle of the mirror shutter on the camera.

The ARRIFLEX 435ES is equipped with an electronically adjustable mirror shutter. This enables automatic adjustment of the shutter angle for shorter exposure times by the Singleframe Hand Control. On the Singleframe Hand Control various exposure times can be set:
Exposure times from 1/128s to 999s with an ARRIFLEX 435ES, and exposure times from 1/8s to 999s when using an ARRIFLEX 435.

If exposure times shorter than 1/8s are required of an ARRIFLEX 435, the shutter angle must be manually adjusted beforehand (see Instruction Manual ARRIFLEX 435).

Note: On longer exposure times – over approx. one second – the reciprocity behaviour of the film becomes visible. This means that the colour reproduction of the film changes. Further information is available from the film manufacturers.

- Set the desired exposure time with the EXPOSURE TIME keys ⇨ **photo**.

- With the 1/SEC SEC ⇨ **photo** switch, select if the exposure time is displayed as whole seconds or as fractions of a second.

7.3.3 Setting the Interval Time

- Set the desired exposure time with the INTERVAL TIME keys ⇨ **photo**.

- With the HRS:MIN / MIN:SEC switch ⇨ **photo**, select if the interval time is shown as hours:minutes or minutes:seconds.

Note: The interval time is defined as follows: it reaches from the opening of the Integrated Capping Shutter for the first singleframe of a singleframe cycle to the opening of the Integrated Capping Shutter for the first singleframe of the next singleframe cycle.

7.3.4 Minimum Interval Time

The minimum interval time is calculated from the exposure time and the number of repeats (burst). It can be calculated as follows:

Minimum interval time = (exposure time+offset)*burst + 0.4s

The 0.4 seconds at the end of the formula represent the time the Integrated Capping Shutter needs to open and close.

Note: SFHC with software versions before SFHC 2.11 use 0.6 seconds.

Note: For exposure times under 1/8s, 1/8s is still used in the formula, as exposure times under 1/8s are achieved through the shutter angle.

On the Singleframe Hand Control, the next higher interval time can be set (e.g. calculated minimum interval time: 1.12s => interval time set: 2s).

The offset is created by the time the movement mechanism needs to transport the film after the mirror shutter is closed.

The offset and two samples can be determined in the following table:

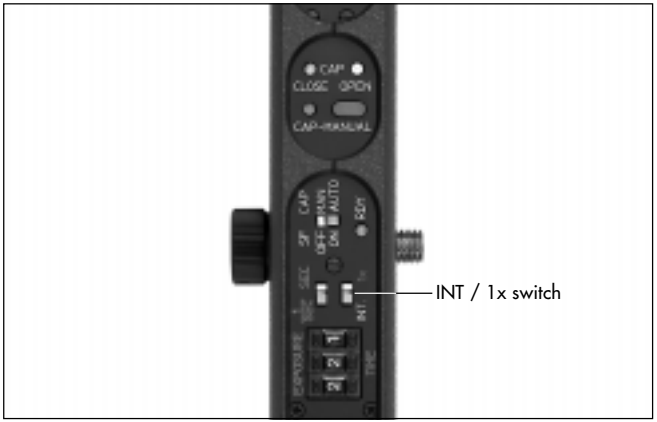
Exposure time	Offset	e.g.: burst=1 min. interval time	e.g.: burst=2 min. interval time
999s – 1/2s	0.58s		
1/3s	0.39s	1.12s => 2s	1.85s => 2s
1/4s	0.3s	0.95s => 1s	1.50s => 2s
1/5s	0.23s	0.83s => 1s	1.26s => 2s
1/6s	0.2s	0.87s => 1s	1.13s => 2s
1/7s	0.16s	0.70s => 1s	1.01s => 2s
1/8s – 1/128s	0.14s	0.67s => 1s	0.93s => 1s

7.3.5 Starting Intervallometer Operation

- Turn the 1x / INT switch ➪ **photo** to the INT position.

7.3.6 Stopping Intervallometer Operation

- Turn the 1x / INT switch ➪ **photo** to the 1x position.



7.4 Remote Operation

Activation of singleframes and starting or stopping intervallometer operation can be remotely controlled by cable.

7.4.1 Preparing for Remote Operation

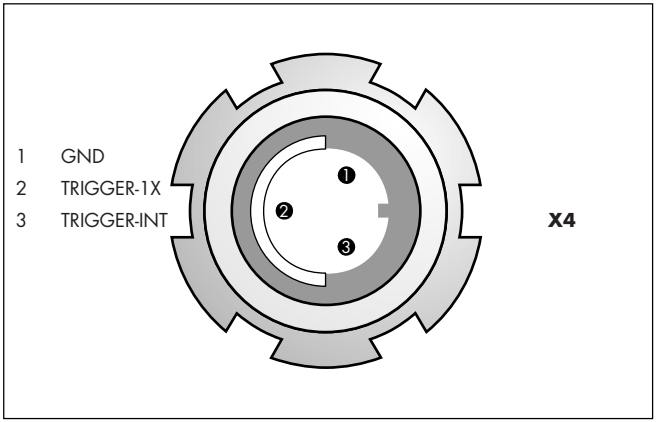
- For remote operation the 1x / INT switch must be in the 1x position.
- Set exposure time, repeat counter and – for intervallometer operation – the interval time on the Singleframe Hand Control.
- Plug the remote cable into the remote socket ➪ **photo**.

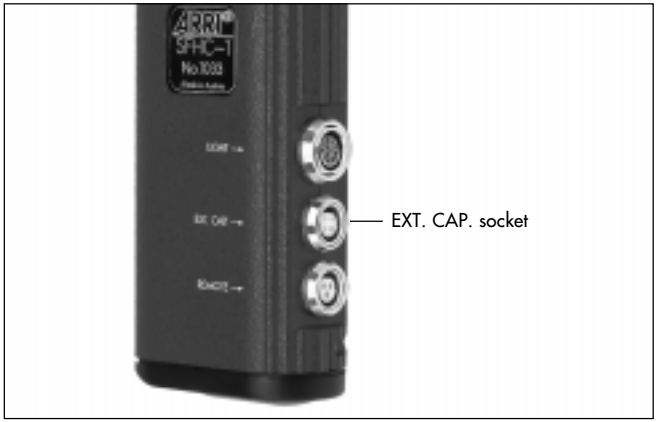
7.4.2 Activating Singleframes

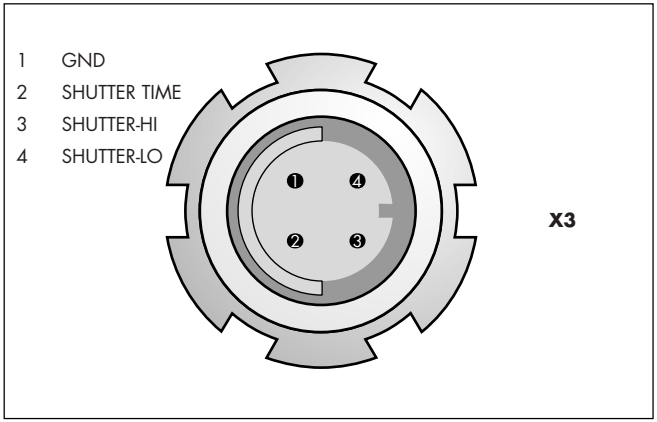
- Through brief connection (minimum 0.05s) of the TRIGGER 1x and GND contacts, a singleframe cycle is started (as if pressing the exposure key).

7.4.3 Starting Intervallometer Operation

- By connecting the TRIGGER INT and GND contacts, intervallometer operation is started. This runs as long as the contacts remain connected.







7.5 External Capping Shutter

As the Integrated Capping Shutter is only light-tight for approx. one hour under normal lighting conditions, an external capping shutter in front of the lens should be used **in addition to** the Integrated Capping Shutter for interval times of over an hour. The external capping shutter is also controlled automatically by the Singleframe Hand Control via the EXT. CAP. socket ➪ **photo**.

The signal to open the external capping shutter is given by the Single Frame Hand Control through short-circuiting the contacts SHUTTER-HI and SHUTTER-LO ➪ **photo**.
The signal to close the external capping shutter is given by separating the connection between the contacts SHUTTER-HI and SHUTTER-LO.

The internal switch of the Singleframe Hand Control (SHUTTER-HI, SHUTTER-LO) may be loaded with max. 100 mA and 60V).

The external capping shutter is plugged into the EXT. CAP. socket ➪ **photo**.

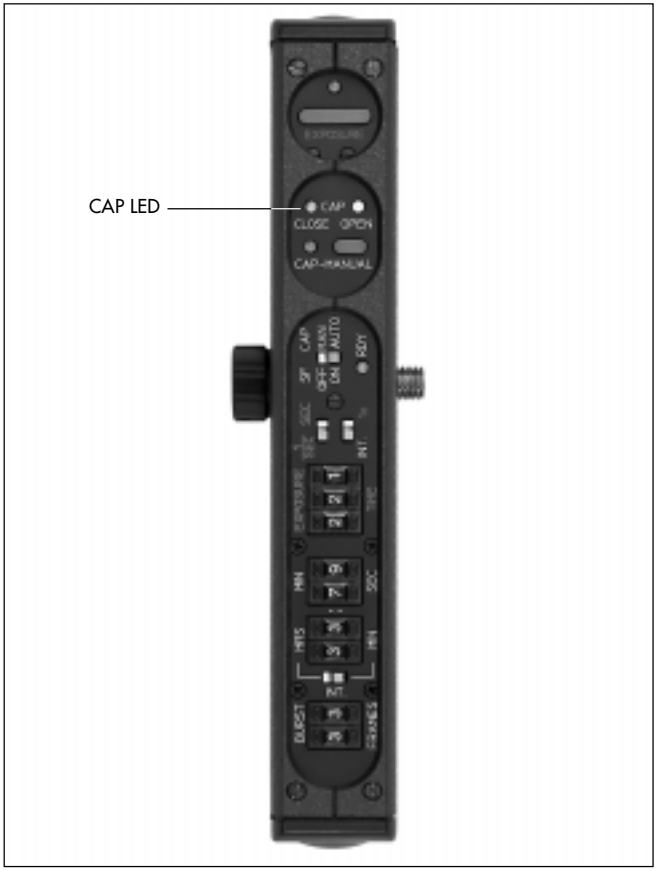
External capping shutters need more time to open than the Integrated Capping Shutter. The length of time to open the external capping shutter in advance is determined by a resistance between the contacts SHUTTER-TIME and GND in the cable. Combined with this resistance, the Singleframe Hand Control gives the signal to open the external capping shutter in time.

Select the resistance to ensure that the capping shutter is completely opened before exposure begins.

The following table shows resistance values and the resulting times. If the contacts are only short-circuited, a time of 2.5 seconds results.

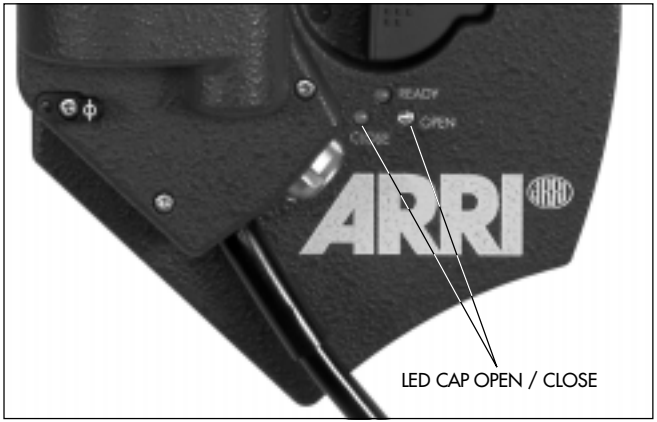
Resistance [ohm]	Time [s]
100	0.1
150	0.2
200	0.3
270	0.4
360	0.5
470	0.7
620	1.0
820	1.4
1200	2.0
2000	3.1
2700	4.1
3600	5.0
4700	6.2
5600	6.9
6800	7.9
10000	9.7

Cables are available upon request.



Note: When starting the interval, the external capping shutter is switched on first. The first exposure takes place after the set shutter opening time, as determined by the resistance, has ended. The interval time runs from the opening of the integrated capping shutter.

On the Singleframe Hand Control green blinking of the CAP LED ⇨ **photo** indicates the connection of an external capping shutter. In addition, the OPEN and CLOSE LEDs ⇨ **photo** blink during opening or closing of the external capping shutter.



7.6 Light Control

7.6.1 Switching on/off Light

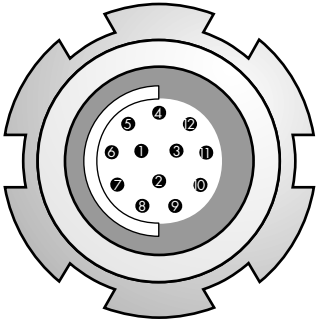
The Singleframe Hand Control generates output signals which enable through the LIGHT socket ⇨ **photo** luminaires to be switched on via an external power circuit at a certain time before exposure and then switched off immediately after exposure. The signal to activate the light is given by the Singleframe Hand Control by short-circuiting the contacts LIGHT-HI and LIGHT-LO ⇨ **photo**.

How long before exposure the signal for the light is given can be determined via a resistance between the contacts LIGHT-TIME and GND ⇨ **photo** in the cable which is plugged into the LIGHT socket.

Select the resistance so that all lighting instruments reach their full brightness and colour temperature.

The internal switch of the Singleframe Hand Control (LIGHT-HI, LIGHT-LO) may be loaded with max. 100 mA and 60V).

1	GND
2	LTM –>SF
3	SF –> LTM
4	LIGHTMETER
5	GND
6	5V-LTM
7	LIGHT-TIME
8	GND
9	LIGHT-HI
10	LIGHT-LO
11	FLASH-HI
12	FLASH-LO



X2

Resistance [ohm]	Time [s]
100	0.1
150	0.2
200	0.3
270	0.4
360	0.5
470	0.7
620	1.0
820	1.4
1200	2.0
2000	3.1
2700	4.1
3600	5.0
4700	6.2
5600	6.9
6800	7.9
10000	9.7

Cables are available upon request.

The following table shows the resistance values and the resulting times. If the contacts are only short-circuited, the time will be 5.3 seconds

Note: When starting the interval, the light is switched on first, and the first exposure takes place after the time determined by the resistance. The interval time runs from the opening of the integrated capping shutter.

Note: The light control is active for interval times longer than 20 seconds. For Interval times shorter than this, the contacts remain closed.

7.6.2 Flash Control

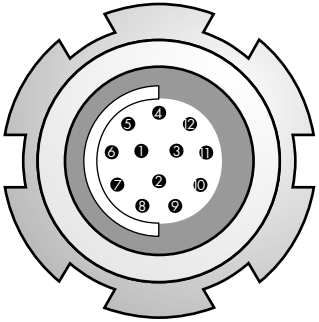
The Singleframe Hand Control generates an output signal to control a flash. Commercially available flash units can be used. They are plugged into the LIGHT socket ⇨ **photo** with a special cable. The signal to activate the flash is given by the Singleframe Hand Control by short-circuiting the contacts FLASH-HI and FLASH-LO ⇨ **photo**.

When selecting a flash unit make sure that it recharges quickly enough. The Singleframe Hand Control does not check whether the flash is ready for use.

When exposing with flash, the entire image is exposed at once. The shutter angle of the camera may therefore not be smaller than 45°.
A minimum exposure time of 1/32s results.

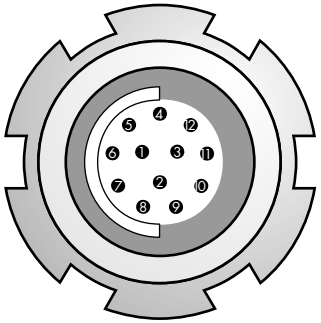
The internal switch of the Singleframe Hand Control (FLASH-HI, FLASH-LO) may be loaded with max. 100 mA and 60V).

1	GND
2	LTM –>SF
3	SF –> LTM
4	LIGHTMETER
5	GND
6	5V-LTM
7	LIGHT-TIME
8	GND
9	LIGHT-HI
10	LIGHT-LO
11	FLASH-HI
12	FLASH-LO



X2

1	GND
2	LTM –>SF
3	SF –> LTM
4	LIGHTMETER
5	GND
6	5V-LTM
7	LIGHT-TIME
8	GND
9	LIGHT-HI
10	LIGHT-LO
11	FLASH-HI
12	FLASH-LO



X2

7.6.3 Exposure Meter

An exposure meter can be plugged into the Singleframe Hand Control LIGHT socket via a special cable. The exposure time is then adapted automatically to the changing light conditions. This function can be used with intervallometer or singleframe operation.

The power supply of the exposure meter can take place via the contact 5V-LTM ⇨ **photo** at +5V max. 100mA. The exposure meter signal is scanned in via the contact LIGHTMETER ⇨ **photo**. The voltage range is between 0 and 5V. An increase in voltage of +0.05V is equivalent to halving the light measured. A voltage reduction of 0.05V is equivalent to doubling the light.

- Set the repeat counter (and if necessary the interval time) on the Singleframe Hand Control.
- Attach the exposure meter with the special cable to the Singleframe Hand Control LIGHT socket.
- Adjust the exposure meter so that it correctly measures the light of the scene to be recorded.
- Set the exposure time on the Singleframe Hand Control for the current lighting conditions.

- With the first exposure (pressing the exposure key or starting the intervallometer operation by switching the 1x / INT switch to INT ⇨ **photo**) the lightmeter operation is started (RDY LED blinks green).

The Singleframe Hand Control adapts the exposure time to changing lighting conditions immediately before the next exposure.

Note: By switching the singleframe operation off and on (SF switch OFF / ON) the current lightmeter values are erased.

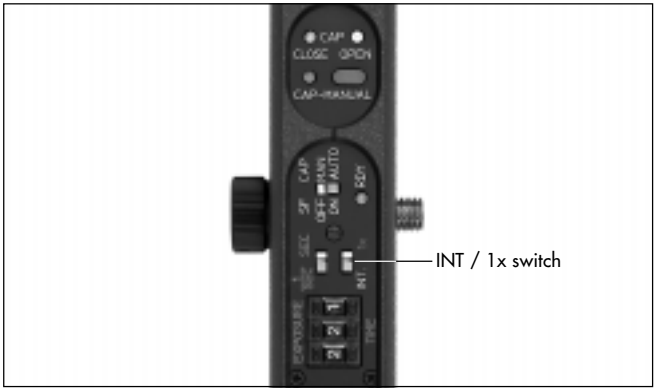
When setting exposure time particular attention must be paid to the way in which the lighting conditions will probably change so that exposure time limits are not exceeded.

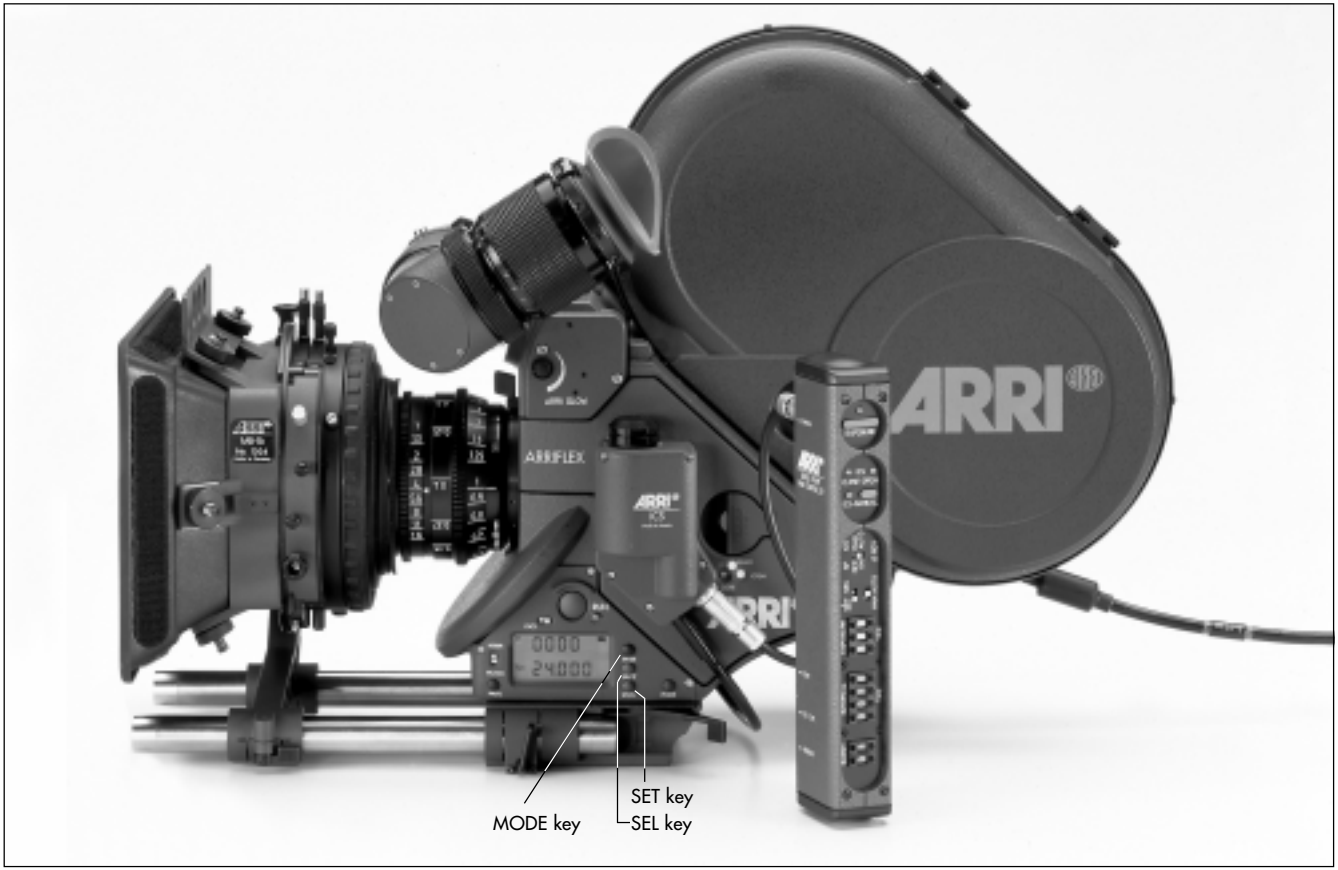
Note: If the exposure time drops under its limits during filming, the takes continue with the shortest possible exposure time. The READY LED on the Singleframe Hand Control blinks red.

Note: If the exposure time multiplied by the number of repeats (burst) exceeds the set interval time due to changing lighting conditions, exposure time will continue with the current values, i.e. the interval time will be exceeded. The next exposure then begins immediately after the last one has ended. (For precise calculation of the minimum interval time see the heading Minimum Interval Time)

Note: On longer exposure times (over approx. one second), the reciprocity behaviour of the film becomes visible. This means that the film's colour reproduction changes. Further information is available from film themanufacturers.

For ASAHI Pentax Spotmeter V with integrated interface (Norris) the cable SF-L1-S is available K2.52069.0.




ARRI
ARRIFLEX
0000
24000
MODE key
SET key
SEL key

8. Indicators on the Camera Display

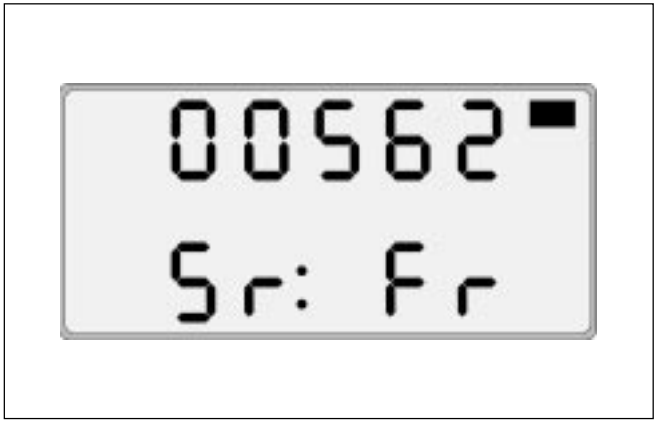
As soon as singleframe operation on the Singleframe Hand Control is switched on (switch SF to ON), "SF" is displayed in the lower line of the camera display.

In Mode 1 of the camera display (recognisable by the horizontal black bar in the upper right-hand corner) various information can be displayed. The following four indications can be set:

- Total exposed film or take counter in meters or feet depending on the setting (see Instruction Manual ARRIFLEX 435), recognisable by the m/ft symbol in the display.
- Shutter angle of the mirror shutter, recognisable by the triangular symbol in the display.
- Framecounter, recognisable by the letters Fr in the lower display line.
- Remaining interval time, recognisable by the colon between hours and minutes in the upper display line.

8.1 Configuring Mode 1 of the Camera Display

- If the display is not in Mode 1 (recognisable by the horizontal black bar in the upper right-hand corner), change to Mode 1 by pressing the MODE key ⇨ **photo** several times.
- Press the SEL key ⇨ **photo** several times to select the desired indications.
- Press the SET key ⇨ **photo** to confirm the selection.



8.2 Framecounter

In the upper line of the camera display the total number of recorded singleframes is displayed ➪ **photo**. If the camera runs in reverse, the framecounter can also display negative values. A minus-sign is then displayed in front of the letters FR.

Resetting the Framecounter

- Press the SET key and hold down for approx. 1.5 s to reset the framecounter to 0.

8.3 Burstcounter

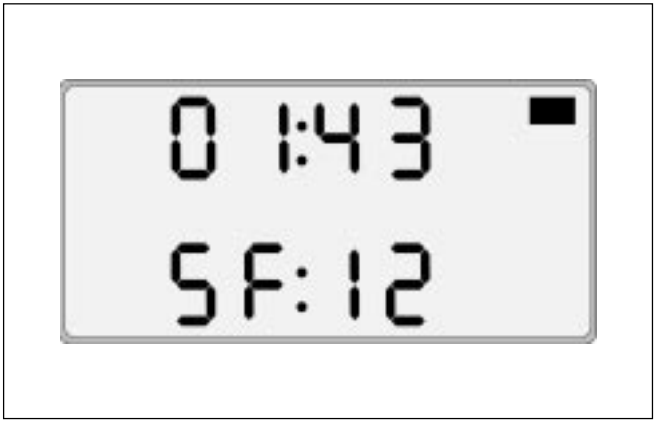
On singleframe shots the repeat counter can be set on the Singleframe Hand Control. This determines the number of singleframes which will be recorded immediately after one another in each singleframe cycle. When starting the single-frame cycle, the remaining number of singleframes in this cycle will be displayed in the lower line of the camera display ➪ **photo**.

8.4 Interval Time

In Mode 1 of the camera display the remaining interval time can be displayed.

In the upper line the remaining hours and minutes are displayed, in the lower line next to the letters SF the remaining seconds ⇨ **photo**.

If the interval has not yet started, in the upper line intermittent dashes will be displayed and in the lower line “SF:INT”.



9. Trouble-Shooting

Display	Display	Cause	Remedy
RDY LED does not illuminate	**CAP-MANUAL illuminates red**	Integrated Capping Shutter fault Camera not ready (e.g. movement mechanism open)	• Shut camera door • Press CAP-Manual key • Manually check Integrated Capping Shutter movement and accessibility of end stops
	CAP-MANUAL blinks red	Error with external Capping Shutter	• Check external capping shutter and extension cable
All LEDs blink		Singleframe EPROM in the camera missing (camera not modified for singleframe)	• Have camera modified by an ARRI service center
RDY LED blinks red		1) Exposure time set outside acceptable range or 0 seconds	1) Set camera without electronically adjustable mirror shutter to 1/8s to 999s Set camera with electronically adjustable mirror shutter to 1/128s to 999s

Display	Display	Cause	Remedy
RDY LED blinks red		2) Interval time outside acceptable range	2) If MIN:SEC selected: set seconds between 0 and 59. If HRS:MIN selected, set minutes between 0 and 59. Calculation of the minimum interval time see chapter 7.3.4
		3) Exposure time with its repeats is longer than the interval time	3) Increase interval time or reduce number of repeats or shorten exposure time.
RDY LED illuminates red		Camera not ready	• Swing in movement mechanism. • Check camera. • Switch on/off. • Switch SF switch on/off. • Replace SF-C1 cable.
RDY LED illuminates red	**CAP-MANUAL illuminates red**	Error with Integrated Capping Shutter	• Shut camera door • Switch off SF ON/OFF switch, • check Integrated Capping Shutter movement and accessibility of end stops, • switch on SF ON/OFF switch

Display	Display	Cause	Remedy
RDY LED illuminates red	**CAP-MANUAL blinks red**	Error with external capping shutter	• Switch off SF ON/OFF switch, • check external capping shutter and its cable, • switch on SF ON/OFF switch.
RDY LED blinks red	**Exposure LED blinks green**	error during interval 1) Set values were altered during a running interval. The take is continued with the original values.	1) Reset original settings
		2) With attached, exposure meter the exposure limits were exceeded. Exposure continues with the min. or max. possible exposure time	2) Restart the interval if necessary with altered exposure values
RDY LED illuminates red	**Exposure LED illuminates green**	Error during exposure. Possible causes: 1) Camera not ready	1) Check camera
		2) CAP-MANUAL LED illuminates red: Integrated Capping Shutter not ready	2) Check Integrated Capping Shutter movement and accessibility of end stops.

Display	Display	Cause	Remedy
RDY LED illuminates red	**Exposure LED illuminates green**	3) CAP-MANUAL LED blinks red: error with external capping shutter	3) Check external capping shutter (cable)
		4) Filmend	4) Load new film
		5) electronic mirror shutter locked	5) Unlock mirror shutter
RDY LED illuminates red	**Exposure LED blinks green**	Error during interval time, possible causes:	
		1) Camera not ready	1) Check camera
		2) CAP-MANUAL LED illuminates red: Integrated Capping Shutter not ready	2) Check Integrated Capping Shutter move ment and accessibility of end stops
		3) CAP-MANUAL LED blinks red: error with external capping shutter	3) check external capping shutter (cable)
		4) Electronic mirror shutter locked	4) Unlock electronic mirror shutter.
		5) Camera ASY	
RDY LED blinks red/green		Camera power supply too low	• Attach fully charged battery to the camera

Camera Warnings

Entire camera display or RCU display blinks and ASY symbol in viewfinder blinks	Camera is running in normal mode and the Capping Shutter is not completely open

10. Technical Data

Integrated Capping Shutter

Temparature Range: ..... -20°C ... 50°C

Weight: 540g

Time for opening or closing the Integarted Capping Shutter < 250 ms

Singleframe Handcontrol

Temparature Range: ..... -20°C ... 50°C

Weight: 380g

Dimensions: ..... 55x32x220 mm

Settings: ..... exposure time from 1/8s to 999s
at a mirror shutter angle of 180°.

With a mirror shutter angle of 11,2°
the shortes exposure time is 1/128s

Intervallometer operation with interval times
from 1s to 9999s

burst frames counter 1 to 99

Interfaces: ..... Signal out for external Capping Shutters

Trigger-input
automatic signal for switching on luminaires
intervallometer operation

signal-output for controling a flash

Input for external lightmeter to adapt the
exposure to the actual lighting conditions

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